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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
KIM, TAEYOON	
ART UNIT	PAPER NUMBER
1651	
MAIL DATE	DELIVERY MODE
04/29/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/777,425	SANBERG ET AL.	
	Examiner	Art Unit	
	Taeyoon Kim	1651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 February 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5-12 and 14-26* is/are pending in the application.

4a) Of the above claim(s) *19-26* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-12 and 14-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/25/2009 has been entered.

Applicant's amendment and response filed on 2/25/2009 has been received and entered into the case.

Claims 2-4 and 13 have been canceled, claims 19-26 have been withdrawn from consideration as being drawn to non-elected subject matter, and claims 1, 5-12 and 14-18 have been considered on the merits. All arguments have been fully considered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 recites the limitation "the umbilical cord blood composition" in line 1-2. There is insufficient antecedent basis for this limitation in the claim. It appears that the phrase should be "the umbilical cord blood cell composition" instead.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 6, 7, 9, 10, 12, 14 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Isner et al. (US 5,980,887).

Isner et al. teach a method of treating cardiomyopathy or myocardial infarction (myocardial ischemia) by administering an effective amount of endothelial progenitor cells isolated from umbilical cord blood by intravenous infusion (systemic delivery) or site directed delivery via a catheter (direct injection) (col. 3, lines 1-9; col. 6, lines 49-53; col. 7, lines 16-22).

The endothelial progenitor cells isolated from umbilical cord blood is considered as an umbilical cord blood cell based on the definition given in the specification. The specification defines the umbilical cord blood cells as “cells that are present within umbilical cord blood” (p.14-15). Since the endothelial progenitor cells of Isner et al. are present in the cord blood, these cells are considered as umbilical cord blood cells (UCBCs).

Thus, the reference anticipates the claimed subject matter.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 5-12 and 14-18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Pittenger et al. (of record) in view of Dengler et al. (of record) in further view of Edelberg et al. (of record), Erices et al. (of record) and Lim et al. (of record).

Pittenger et al. teach a method of regenerating cardiac muscle using mesenchymal stem cells (MSCs) (see abstract). Pittenger et al. teach human MSCs being introduced to the infarct zone (myocardial infarction; cardiac injury) to reduce the degree of scar formation and to augment ventricular function (treating a circulatory disorder; col. 4, lines 7-19). Pittenger et al. also teach direct or systemic administration (col. 2, lines 25-30) and an amount of cells for administration being 10-40x10^6 MSCs/ml (col. 4, lines 65-67).

Although Pittenger et al. do not teach umbilical cord blood cells used in the method, it would have been obvious to a person of ordinary skill in the art to substitute MSCs of Pittenger with UCBCs. This is because Dengler et al. teach that UCBCs comprise stem cells with a capability of differentiating into cardiac myocytes (p.604, right col. under “umbilical cord stem cells”), Edelberg et al. teach that endothelial progenitor cells, which can also differentiate into cardiomyocytes, are also present in UCB (par. 18 and 24), and Isner et al. teach the use of endothelial progenitor cells derived from UCB in treating of cardiovascular disorder, and therefore, a person of ordinary skill in the art would recognize suitability of UCBCs an alternative to MSCs of

Pittenger et al. in the method of treating cardiovascular dysfunctions.

M.P.E.P. §2144.07 states "The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) (Claims to a printing ink comprising a solvent having the vapor pressure characteristics of butyl carbitol so that the ink would not dry at room temperature but would dry quickly upon heating were held invalid over a reference teaching a printing ink made with a different solvent that was nonvolatile at room temperature but highly volatile when heated in view of an article which taught the desired boiling point and vapor pressure characteristics of a solvent for printing inks and a catalog teaching the boiling point and vapor pressure characteristics of butyl carbitol. "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig-saw puzzle." 325 U.S. at 335, 65 USPQ at 301.)".

Although Dengler et al. do not particularly teach that UCBCs are mesenchymal cells, it is well known in the art that UCBCs comprises mesenchymal progenitor cells according to Erices et al. Therefore, the UCBCs of Dengler et al. inherently comprise mesenchymal cells.

Although Pittenger et al. in view of Dengler et al. and Edelberg et al. do not teach the limitation of administering the UCBCs within approximately 48 hours after the onset of myocardial infarction, a person of ordinary skill in the art would recognize that the range of hours for administration of UCBCs is a result-effective variable. As such, the variables would be routinely optimized by one of ordinary skill in the art in practicing the

invention disclosed by those references. Generally, differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); >see also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); ** In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997). Accordingly, the claimed invention was prima facie obvious to one of

ordinary skill in the art at the time the invention was made especially in the absence of evidence to the contrary.

With regard to the limitation of the umbilical cord blood composition comprising at least 6 million white blood cells per milliliter, the use of UCBCs in a method of treating myocardial infarction as taught by Pittenger et al. in view of Dengler et al. in further view of Edelberg et al. inherently meets the limitation of the white blood cell contents, since Lim et al. teach that UCB contains about 11 million white blood cells per ml (see Table 1).

Therefore, the invention as a whole would have been prima facie obvious to a person of ordinary skill at the time the invention was made.

Response to Arguments

Applicant's arguments filed 2/25/2009 have been fully considered but they are not persuasive.

Applicant alleged that Pittenger et al. use mesenchymal stem cells (MSCs), which are not the MLC cells, and Pittenger et al. disclose that MSC compositions are obtained by culturing adherent marrow or periosteal cells, which are sources of adult MSC not UCB-derived MSCs. Further, applicant asserted that implanting the MSCs in infarct areas where scar tissue formed results in the formation of more scar tissue.

It appears that applicant intends to point out the MLCs of Erices et al. derived from umbilical cord blood cannot replace MSCs of Pittenger et al. because MLCs are not MSCs. As Erices et al. teach and applicant also described in the response, mesenchymal-like cells (MLCs) are considered as MSCs because MLCs can

differentiate into mesenchymal lineage such as osteoblasts and adipocytes. Chen et al. (2001; IDS ref.) teach that human umbilical cord blood cells (HUCBC) are rich in mesenchymal progenitor cells and endothelial cell precursors (p.2682, left col.). Therefore, MLCs of Erices et al. can differentiate into mesenchymal cells and this property is the same as MSCs of Pittenger et al., and a person of ordinary skill in the art would recognize that umbilical cord blood cells (UCBCs) which comprise MSCs is suitable alternative to the MSCs of Pittenger et al. in the method of Pittenger et al.

Furthermore, as indicated in the previous office action, it is well known in the art that UCBCs comprise endothelial cell precursors, which can differentiate into cardiomyocytes and used for cardiovascular dysfunction according to Edelberg et al., therefore, a person of ordinary skill in the art would recognize the benefit of UCBCs comprising MSCs and endothelial progenitor cells can be used for the same purpose of treating cardiomyopathy and heart failure as Pittenger et al.

Still further, based on the incorporation of Dengler et al. in the current office action, it is clearer that UCBCs can be used for treatment of cardiomyopathy and/or myocardial infarction, and thus, it would have been obvious to a person of ordinary skill in the art to substitute MSCs of Pittenger et al. with UCBCs for the same purpose of treating a circulatory disorder.

Applicant also alleged that Erices et al. do not teach that MLC can differentiate into muscle, rather Erices et al. teach osteoblasts and adipocytes. It appears that applicant misinterpreted the office action as if Erices et al. teach that MLC can differentiate into muscle. It was intended to point out that UCB as a potential source for

multipotent MSCs which can differentiate into mesenchymal tissues including muscle. It is correct that Erices et al. do not particularly teach that MLCs differentiate into muscle. However, based on the new claim rejection, it is not the question whether MLCs of Erices et al. can differentiate into cardiomyocytes.

Furthermore, as applicant admitted that the presence of MSCs in UCB referring Kogler et al., Nishiyama et al. or Bieback et al., it is an inherent property of UCB comprises MSCs.

Applicant also asserted that in order to match the minimal amount of MSCs of Pittenger et al., one would administer 1.4×10^{12} UCBCs. This calculation based on Bieback et al. might be correct. However, this calculation is solely based on the amount of MSCs present in UCBCs without considering endothelial progenitor cells co-present in UCBCs. Therefore, it would have been obvious to a person of ordinary skill in the art to optimize the number of UCBCs administered to a patient since it comprises not only MSCs but also endothelial progenitors which also give rise to cardiomyocytes. Thus, the number of UCBCs administered to a patient can be optimized.

Furthermore, applicant asserted that the claimed invention uses between $1x\ 10^4$ and 5×10^7 UCBCs based on the disclosure of the specification. It is noted that the features upon which applicant relies are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Taeyoon Kim whose telephone number is (571)272-9041. The examiner can normally be reached on 8:00 am - 4:00 pm ET (Mon-Thu).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached on 571-272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Taeyoon Kim/
Examiner, Art Unit 1651